Al-Dhahir 2

IN THE CLAIMS:

1. (Currently Amended) A receiver operating in an environment where a transmission channel, **H**, between a transmitter of information and said receiver has a memory corresponding to ν transmitted symbols, said receiver being responsive to an n_o plurality of receiving antennas comprising:

a pre-filter having an $n_o \times n_i$ plurality of FIR filters, $F(j,k)$, where n_i is a number of transmitting antennas whose signals said receiver is processing, j is an index running from 1 to n_o and k is an index running from 1 to n_i, each filter $F(j,k)$ being responsive to a signal that is derived from ~~one of said no antennas~~ receiving antenna j, and applying its output signal to a pre-filter output point k ~~applied to an input point, and each developing an output signal that contributes to one of ni pre-filter outputs~~; and

decision logic responsive to said n_i pre-filter output points.

2. (Currently Amended) The receiver of claim **1** further comprising a sampling circuit interposed between said n_o plurality of antennas and said pre-filter that samples received signal at rate $T_s = \frac{T}{l}$, where *l* is an integer that is greater than 1, and T is symbol rate of a transmitter whose signals said receiver receives.

3. (Currently Amended) The receiver of claim **2** ~~where $l>1$~~ 1 further comprising a preprocessor for computing coefficients of said FIR filters that result in an effective transmission channel memory between said transmitter and output of said pre-filter of N_b that is less than ν.

4. (Currently Amended) The receiver of claim **1** 2 further comprising a preprocessor for computing ~~where~~ coefficients of said FIR filters ~~are computed in a processor~~ in response to a block of N_f symbols that is received by said receiver, and installing the computed coefficients in said FIR filters.

5. (Delete) .

6. (Currently Amended) The receiver of claim **4** where said coefficients of said FIR filters are computed and installed ~~once~~ every time ~~interval during which transfer characteristics of~~ said transmission channel, **H**, exhibits a significant change ~~are substantially constant~~.

7. (Delete) .

8. (Delete) .

9. (Delete) .

10. (Delete) .

11. (Currently Amended) The receiver of claim **10-1** wherein said decision logic is adapted to receive from said transmitting antennas transmitted signals that were encoded in a space-time encoding schema.

12. (Original) The receiver of claim **2** where said plurality of FIR filters is expressed by matrix **W**, and **W** is computed by $\mathbf{W}_{opt}^{*} = \tilde{\mathbf{B}}_{opt}^{*}\mathbf{R}_{xy}\mathbf{R}_{yy}^{-1}$, $\mathbf{W}_{opt}^{*} = \tilde{\mathbf{B}}_{opt}^{*}\mathbf{R}_{xx}\mathbf{H}^{*}(\mathbf{H}\mathbf{R}_{xx}\mathbf{H}^{*} + \mathbf{R}_{nn})^{-1}$, or $\mathbf{W}_{opt}^{*} = \tilde{\mathbf{B}}_{opt}^{*}(\mathbf{R}_{xx}^{-1} + \mathbf{H}^{*}\mathbf{R}_{nn}^{-1}H)^{-1}\mathbf{H}^{*}\mathbf{R}_{nn}^{-1}$, where $\mathbf{R}_{xx}$ is an autocorrelation matrix of a block of signals transmitted by a plurality of transmitting antennas to said n_o antennas via a channel having a transfer characteristic **H**, $\mathbf{R}_{nn}$ is an autocorrelation matrix of noise received by said plurality of n_o antennas during said block of signals transmitted by said transmitting antennas, $\mathbf{R}_{xy} = \mathbf{R}_{xx}\mathbf{H}^{*}$, $\mathbf{R}_{yy} = \mathbf{H}\mathbf{R}_{xx}\mathbf{H}^{*} + \mathbf{R}_{nn}$, and $\tilde{\mathbf{B}}_{opt}^{*}$ is a sub-matrix of matrix $\mathbf{B}_{opt}^{*}$, where $\mathbf{B}_{opt} = \arg\min_{B} trace(\mathbf{R}_{ee})$ subject to a selected constraint, $\mathbf{R}_{ee}$ being the error autocorrelation function.

13. (Original) The receiver of claim **12** wherein said plurality of FIR filters are subjected to designer constraints relative to any one or a number of members of the following set: transmission channel memory, size of said block, effective memory of the combination consisting of said transmission channel and said pre-filter; n_i, n_o, autocorrelation matrix $\mathbf{R}_{xx}$, autocorrelation matrix $\mathbf{R}_{nn}$, value of factor l in said sampling circuit, and decision delay.

14. (Currently Amended) The receiver of claim 12, where said matrix $\mathbf{W}$ is expressible by $\mathbf{W} \equiv \left[\mathbf{W}_0 \quad \mathbf{W}_1 \quad \cdots \quad \mathbf{W}_{N_f-1}\right]^t$, where matrix $\mathbf{W}_q$, q being an index between 0 and N_{f-1}, is a matrix that specifies q^{th} tap coefficients of said FIR filters.

15. (Original) The receiver of claim **12** where said constraint restricts **B** so that $\mathbf{B}^*\mathbf{\Phi} = \mathbf{I}_{n_o}$, where $\mathbf{\Phi}^* \equiv \left[\mathbf{0}_{n_i \times n_i m} \quad \mathbf{I}_{n_i} \quad \mathbf{0}_{n_i \times n_i (N_b - m)}\right]$ and m is a selected constant.

16. (Original) The receiver of claim **15** where $\mathbf{B} = \bar{\mathbf{R}}^{-1}\mathbf{\Phi}(\mathbf{\Phi}^*\bar{\mathbf{R}}^{-1}\mathbf{\Phi})^{-1}$, $\bar{\mathbf{R}}$ is a sub-matrix of a matrix $\mathbf{R}^{\perp} = \mathbf{R}_{xx} - \mathbf{R}_{xy}\mathbf{R}_{yy}^{-1}\mathbf{R}_{yx}$.

17. (Original) The receiver of claim **12** where said constraint restrict **B** so that $\mathbf{B}^*\mathbf{B} = \mathbf{I}_{n_i}$.

18. (Original) The receiver of claim **17** where $\mathbf{B} = \mathbf{U}\left[\mathbf{e}_{n_i N_b} \quad \cdots \quad \mathbf{e}_{n_i (N_b+1)-1}\right]$, each element e_p is a vector having a 0 element in all rows other than row p, at which row the element is 1, and U is a matrix that satisfies the equation $\bar{\mathbf{R}} \equiv \mathbf{U}\mathbf{\Sigma}\mathbf{U}^*$, $\mathbf{\Sigma}$ being a diagonal matrix.